

(3) performing RIE for each step in a chlorine gas atmosphere, and (4) performing RIE for each step at a temperature ranging from 150°C to 250°C, as recited in claim 18.

The combination of conditions recited in claim 18 avoids using a plurality of etching methods or continuously setting conditions even though a single etching method is used. In other words, the combination of conditions recited in claim 18 achieves advantages in that a first magnetic material layer, a gap layer and a second magnetic material layer can all be etched at one time under given conditions with high precision through the use of RIE. For example, the following advantages are achieved:

(1) Chlorine gas is used as the etching gas. Preparation is thus easier and costs are reduced.

(2) The etching temperature is set high because it does not damage the MR element by heat. The performance of the magnetic head can thus be maintained.

(3) The mask and the gap layer are made of aluminum oxide, which has a low etching rate. A loss of shape in the mask during etching can thus be prevented.

(4) The gap layer functions as a stopper layer in the etching process of the first magnetic layer. The first uniform width portion is thus formed with high precision.

JP'223 discloses a method of making a thin-film magnetic head. As discussed in the corresponding U.S. Patent, U.S. Patent No. 6,419,845, JP'223 discloses first and second magnetic layers 3, 5 that each include a magnetic pole and are magnetically coupled to each other (col. 9, line 47- col. 10, line 4). JP'223 also discloses using RIE and ion milling together (col. 10, lines 21 -37, for example). However, JP'223 only discloses using RIE for the mask-forming process and does not use RIE in the etching process of the first magnet material layer, the gap layer and the second magnetic material layer. Because JP'223 does not use RIE in the etching process of the first magnet material layer, the gap layer, and the second

magnetic material layer , JP'223 fails to provide any disclosure or suggestion with regard to the conditions for etching the magnetic material layer through the use of RIE.

Although using RIE in a part of the forming process of a trim structure may be known, the conditions under which the first magnetic material layer, the gap layer and the second magnetic material layer are all etched through the use of RIE in a short time with high precision is not known. Furthermore, as discussed above, JP'223 only uses RIE for a mask-forming process and not for an etching process of a magnetic material layer.

Hara and Ichihara fail to overcome the deficiencies of JP'233 in disclosing all of the conditions under which the first magnetic material, the gap layer and the second magnetic material are etched through the use of RIE, as recited in claim 18.

Hara discloses using RIE instead of ion milling as an etching method. However, Hara fails to disclose either etching a first magnetic material layer, a gap layer and a second magnetic material layer through the use of RIE under the given conditions of claim 18, or the conditions for etching the magnetic material layer through the use of RIE. In Hara, the high conductive layer (good conductivity film 17') is etched using the magnetic material layer as a stopper layer (Fig. 3 and col. 7, lines 3-41). Hara uses the magnetic material layer as a stopper layer in order to avoid etching the magnetic material layer (MR film 15). Hara thus fails to etch the magnetic material layer through the use of RIE and it is not clear as to whether etching of the magnetic material layer through the use of RIE can be performed.

Ichihara discloses etching a magnetic material layer through the use of RIE. However, Ichihara fails to disclose etching the first magnetic material layer, a gap layer and a second magnetic material layer through the use of RIE under the conditions recited in claim 18. Moreover, Ichihara not only uses mixed gas but also sets the temperature high enough in order to damage the MR element by heat.

It is respectfully requested that the rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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